

NDCEE

National Defense Center for Environmental Excellence



DoD Executive Agent

Office of the
Assistant Secretary
of the Army
(Installations and
Environment)

HAP Reduction in Rubber-to-Metal Bonding Operations

Joint Services Environmental Management (JSEM)

Training Conference and Exposition May 8, 2008

Mr. Kevin Merichko, NDCEE/CTC

The NDCEE is operated by:  *Concurrent Technologies Corporation*

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 08 MAY 2008		2. REPORT TYPE		3. DATES COVERED 00-00-2008 to 00-00-2008	
4. TITLE AND SUBTITLE HAP Reduction in Rubber-to-Metal Bonding Operations				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) National Defense Center for Energy and Environment (NDCEE), Concurrent Technologies Corporation, 100 CTC Drive, Johnstown, PA, 15904				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 14	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Background

- The Sustainable Painting Operations for the Total Army (SPOTA) Program was initiated in anticipation of impending National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations such as the Defense Land Systems and Miscellaneous Equipment (DLSME).
- Red River Army Depot (RRAD) manufactures roadwheels and track pads for use on tracked vehicles by the DoD.
- The Rubber-to-Metal Bonding (RTMB) process uses an adhesive that is applied to metal cores, allowed to dry, and then crosslinked when the rubber is molded to the core in an injection mold process.
- Current materials in this process contain xylene which is a hazardous air pollutant (HAP).
- HAP emission reduction will help RRAD comply with the impending DLSME NESHAP.

Approach

- **Establish** a baseline of current surface coating operations
- **Identify** potentially viable material and process alternatives
- **Develop** documentation to guide the team as they qualify and implement alternatives
- **Evaluate** identified alternatives
- **Address** implementation logistics

Evaluation of RTMB Alternatives at RRAD

- Testing indicates that parts manufactured with one waterborne alternative are capable of passing first article evaluations
 - T-107 and T-157 Tracks
 - 25" x 6" roadwheel
 - 24" x 3.75" roadwheel
 - Passed adhesion and six hour drum test
 - 1 failure out of 4 in 48 hour drum test
- A newly developed, reduced-HAP solvent-borne adhesive was also identified and evaluated at RRAD
 - Passed First Article Testing for T-107 and T-157 tracks
 - Roadwheel tests indicated failures in drum testing

Path to Implementation

- Completed First Article Testing of waterborne materials
- Identified on-vehicle test requirements
 - On-vehicle testing requires the production of parts using alternative materials
- Determined that preheating parts for application of waterborne materials is the limiting step in production
- Identified induction heating as having the potential to limit production bottlenecks when compared to a conventional oven

Induction Heating Components



Power Supply



Remote Heat Station

Induction Heating Coil Types



Conveyor Tunnel Coil



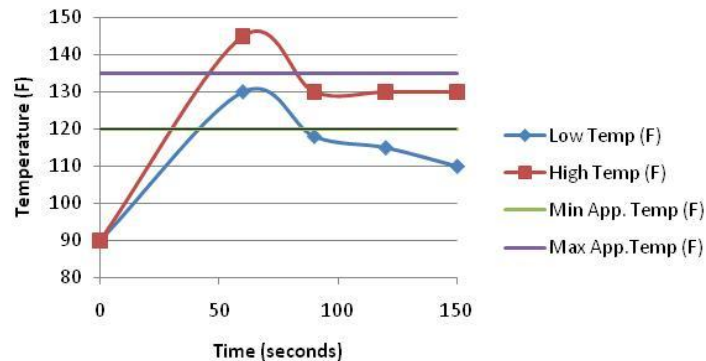
Pancake Coil



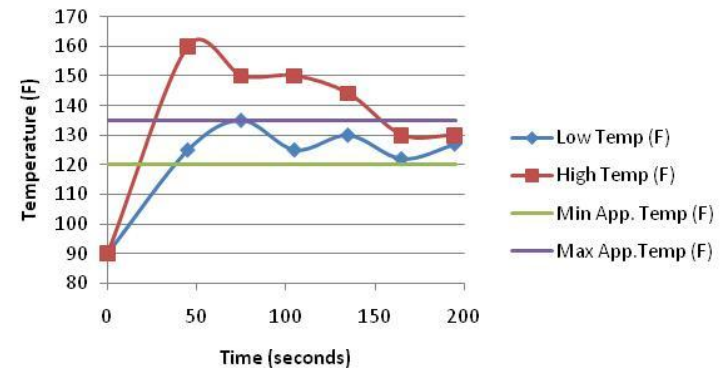
Modified Pancake Coil

Preliminary Technology Evaluation Results

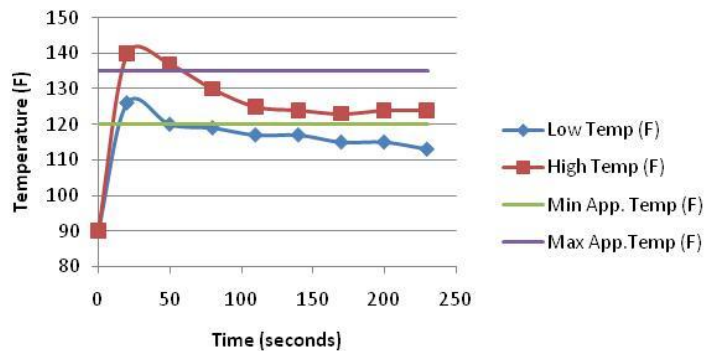
25" x 6" Wheel - Run #1



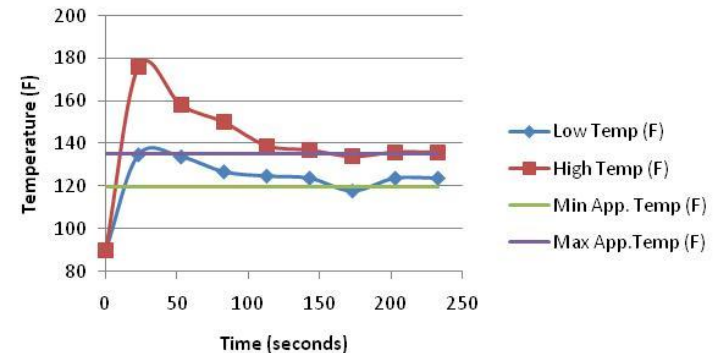
25" x 6" Wheel - Run #2



T-157 Track - Run #1



T-157 Track - Run #2 (1/2" shift)



Preliminary Technology Evaluation Conclusions

- Induction heating technology is capable of heating roadwheels to the desired application temperature with acceptable variance.
- Induction heating technology is capable of heating tracks to the desired application temperature with acceptable variance.
- This technology warrants further evaluation in a production setting to evaluate applicability to RRAD track and roadwheel manufacturing processes.

Low Rate Production Demonstration Results

- Info to be added upon completion of demonstration which will occur in April 2008

Low Rate Production Demonstration Conclusions

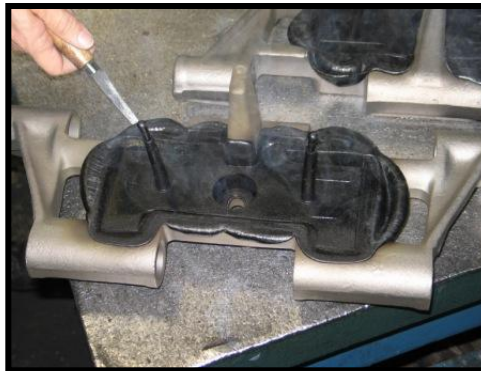
- Info to be added upon completion of demonstration which will occur in April 2008

Path Forward

- Conduct on-vehicle testing of parts cured with induction heating from low rate production demonstration
- WILL BE UPDATED BASED ON RRAD DEMO RESULTS



Track block with adhesive applied (ready to mold)



Molded track block (technician trimming excess rubber)



Palletized complete track blocks

Project Stakeholders

- Red River Army Depot (RRAD)
- Research, Development and Engineering Command (RDECOM)
- Tank-Automotive Research, Development and Engineering Center (TARDEC)

Contact Information

NDCEE Technical Monitor

NDCEE Task N. 0446 – FY06 Sustainable Painting Operations for the Total Army (SPOTA)

Name: Ms. Maryalice Miller

Organization: RDECOM

E-Mail: Maryalice.Miller@us.army.mil

Phone Number: (410) 436-3564

NDCEE Project Manager

Name: Mr. Kevin Merichko

Organization: NDCEE/CTC

E-Mail: merichko@ctc.com

Phone Number: (814) 269-2530

www.ndcee.ctc.com

This work was funded through the Office of the Assistant Secretary of the Army (Installations and Environment) and conducted under contract W74V8H-04-D-0005 Task 0446.

The views, opinions, and/or findings contained in this paper are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other official documentation.